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(54) THERMO-INSULATING PANELS

(71) We, SOCIETE CHEMIQUE DES CHARBONNAGES of Tour Aurore-Cedex 5, 92080 Paris La Defense, France, a body corporate organised under the Laws of France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of thermally insulating high walls externally by means of thermo-insulating panels.

A method of thermally insulating walls of varying heights by using polystyrene or PVC foam panels which are fixed on to the walls has already been suggested. A method of thermal insulation with the aid of polystyrene foam panels has already been described in which panels with a specific gravity of 10 to 25 kg/m³ are used. This method consists in sticking the panels onto the surface of the wall, then covering the external surface of the panels with a suitable coating, a glass fibre cloth and a superficial coating. A method of thermal insulation using PVC foam panels has also been described in which the panels are mounted onto each other by means of metallic members which are suitably arranged. These methods give rise to various technical or economical problems, in particular, when high walls are to be insulated.

The present invention provides a method of thermally insulating a high wall by means of foam panels on the external part of the wall, in which method:

(i) phenol-formaldehyde foam panels having a thickness within the range of from 3 to 8 cm, inclusive, are used, the foam having a density within the range of from 40 to 80 kg/m³, inclusive;

(ii) the panels are fixed to the wall by adhesion and by pinning with the aid of pins comprising a thermally insulating substance; and

(iii) the external surface of the panels is covered by means of an under-coat in which glass cloth is inserted followed by an external coating.

The term high means more than approximately 6 metres high.

Taking into consideration the fact that the panels used in accordance with the present invention will have to be fixed onto the walls and that they will have to be covered with a coating, the materials used for constructing the said panels need to have good mechanical properties. This involves the choice of the density of the phenol-formaldehyde foam.

The density of the foam determines the thermal conductivity of the material, defined as the coefficient λ, which is within the range of from 0.032 to 0.036 kcal/mh°C., inclusive.

As regards the thickness of the panels, this has been chosen, on the one hand, in relation to the mechanical properties of the base material and, on the other hand, in relation to the insulating quality which one wishes to obtain.

However, the choice of panels to be used implies that means for installing the panels are available. Purely mechanical means (such as the use of frames for example) are too cumbersome; purely chemical means (adhesives) are not reliable enough. This is why, according to the present invention, the phenol-formaldehyde foam panels are fixed onto the external walls to be covered, by a combination of an adhesive and a mechanical fixing means comprising a pin comprised of a thermally insulating substance.

If the wall to be coated is painted, the adhesive used according to the invention is an acrylic adhesive; if the wall to be covered is not painted, this adhesive comprises known "plaster-adhesive mixtures"; it is obviously possible also to use an acrylic adhesive for the coating of unpainted walls but this may be more cumbersome.

Once the panels are installed, they are surfaced in known manner by means of an under-coat in which a glass fibre cloth is inserted. This glass fibre cloth is installed in such a way that each strip covers the adjacent strip over a width of approximately 3 cm; in this way, any interruption in the

overall covering of the foam panels is avoided. The assembly is covered with a coating. In the method of the present invention the under-coat is preferably an acrylic coating.

The undercoat, into which the glass fibre cloth is inserted, and the final coating play an important role from a technical and an aesthetic point of view. Thus, the panels are preferably pinned once the external surfaces of the panels have received their under-coats and the glass fibre cloth; in this way, the cloth plays a role in the upkeep of the panels.

In addition, in order to make quite sure that the possible appearance of fissures in the coating resulting from the joints between the thermoinsulating panels is avoided, it is possible to cover these joints with a strip of paper which is coated with a silicone. This strip must be sufficiently wide, for example, with a width of substantially 25 mm; the strip is stuck onto the panels with known adhesives (it is obviously possible to use an adhesive strip if the adhesive is suitable) in such a way that the side of the strip which is coated with silicone is turned towards the exterior. The coating will thus be situated level with the separated joints of the panels.

The non-limitative example below illustrates the invention. In order thermally to insulate a 30 metre high building with a painted wall, the following operations are effected:

(i) the wall is cleaned by washing with water and then brushing and drying;

(ii) acrylic adhesive is placed on one of the surfaces of a phenol-formaldehyde resin foam panel with a density of 60 kg/m³ in 40 to 60 g blobs, the size of the panel being 1000 mm × 500 mm × 50 mm;

(iii) the panel is installed on the corresponding part of the wall commencing from the bottom, the consecutive panels being arranged edge to edge in all directions;

(iv) the under-coat, which is a layer of approximately 3 mm of a known acrylic coating is administered and the glass cloth is impregnated into it;

(v) the plastics (polyethylene) pins having the shape of a four-leaf clover whose stem has a fixing means at its free end are then positioned, (this positioning is carried out by piercing the assembly of the glass cloth, insulating under-coat and part of the wall (this part representing 5 cm., for example) with the aid of a twist drill having a gauge which corresponds to the diameter of the stem);

(iv) pins with a stem diameter of substantially 8 mm and whose heads have an external diameter of the order of 60 mm are preferably used (approximately 3 to 7 of these pins will be used per square metre of panel); and

(vii) the surface is then covered with the aid of a known acrylic coating.

WHAT WE CLAIM IS:—

1. A method of thermally insulating a high wall by means of foam panels on the external part of the wall, in which method:

(i) phenol-formaldehyde foam panels having a thickness within the range of from 3 to 8 cm, inclusive, are used, the foam having a density within the range of from 40 to 80 kg/m³, inclusive;

(ii) the panels are fixed to the wall by adhesion and by pinning with the aid of pins comprising a thermally insulating substance; and

(iii) the external surface of the panels is covered by means of an under-coat in which glass cloth is inserted followed by an external coating.

2. A method according to claim 1, in which the adhesive used for sticking the panels to the wall is of the acrylic type if the said wall is painted.

3. A method according to claim 1 or 2, in which pinning is obtained with the aid of 3 to 7 pins per square metre of the panel.

4. A method according to any of claims 1 to 3, in which the joints between the panels are covered before administering the under-coat and the external coating, with the aid of a paper coated with a silicone.

5. A method according to any of claims 1 to 4, in which the under-coat is of the acrylic type.

6. A method according to any of claims 1 to 5, in which the installation of the insulation panels comprises the following consecutive operations:

(i) cleaning of the wall surface;

(ii) sticking the panels to the wall;

(iii) positioning of paper coated in silicone over the joints, if necessary;

(iv) covering the panels with an under-coat;

(v) insertion of glass cloth in the under-coat;

(vi) pinning the panels to the wall; and

(vii) administration of the external coating.

7. A method of wall insulation substantially as herein described with reference to the specific example.

8. Walls insulated by a method according to any of claims 1 to 7.

ELKINGTON AND FIFE,
Chartered Patent Agents,
High Holborn House,
52/54 High Holborn,
London, WC1V 6SH.
Agents for the Applicants.

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